Chapter 15 Preapproved Wall Appendix: Specific Requirements and Details for Tensar ARES Walls

In addition to the general design requirements provided in **Appendix 15-A**, the following specific requirements apply:

The detailed design methodology, design properties, and assumptions used by Tensar Earth Technologies for the ARES wall are summarized in the HITEC evaluation report for this wall system (**HITEC, 1997, *Evaluation of the Tensar ARES Retaining Wall System*, ASCE, CERF Report No. 40301**). The design methodology, which is based on the Standard Specifications for Highway Bridges (**2002**) is consistent with the general design requirements in **Appendix 15-A**, except as noted below. Interim approval is given for the continued use of the AASHTO Standard Specifications as the basis for design.

Reinforcement pullout shall be calculated based on the default values for geogrid reinforcement provided in the AASHTO Specifications. For LRFD based design, while it is recognized that product and soil type specific pullout interaction coefficients obtained in accordance with the AASHTO LRFD Specifications for the Tensar products used with this wall system are provided in the HITEC report for the ARES Wall system, pullout resistance design using these product and soil specific interaction coefficients has not been calibrated using the available product specific data statistics and reliability theory. Therefore, the specified resistance factors in the GDM and AASHTO LRFD Specifications should not be considered applicable to the product specific pullout interaction coefficients provided in the HITEC report.

The reinforcement long-term tensile strengths (T_{al}) provided in the WSDOT Qualified Products List (QPL) for the Tensar Geogrid product series, which are based on the 2003 version of the product series, shall be used for wall design, until such time that they are updated, and the updated strengths approved for WSDOT use in accordance with WSDOT Standard Practice T925. Until such time that the long-term reinforcement strengths are updated, it shall be verified that any material sent to the project site for this wall system is the 2003 version of the product. Furthermore, the short-term ultimate tensile strengths (ASTM D6637) listed in the QPL shall be used as the basis for quality assurance testing and acceptance of the product as shipped to the project site per the WSDOT Standard Specifications for Construction.

The HITEC report provided details and design criteria for a panel slot connector to attach the geogrid reinforcement to the facing panel. Due to problems with cracking of the facing panel at the location of the slot, that connection system has been discontinued and replaced with a full thickness panel in which geogrid tabs have been embedded into the panel. For this new connection system, the geogrid reinforcement is connected to the geogrid tab through the use of a Bodkin joint. Construction and fabrication inspectors should verify that the panels to be used for WSDOT projects do not contain the discontinued slot connector.

The Bodkin connection test results provided by letter to WSDOT dated September 28, 2004, were performed on the 2003 version of the Tensar geogrid product line. In that letter, it was stated that UMESA6 (UX1700HS) will typically be used for the connector tabs, regardless of the product selected for the reinforcement. If a lighter weight product is used for the connector tabs, the connection strength will need to be reduced accordingly. **Table 15-(Tensar ARES)-1** provides a summary of the connection strengths that are approved for use with the ARES wall system.

Tensar Soil Reinforcement Geogrid Product	Tensar Panel Connector Tab Geogrid Product	T_{ult} (MARV) for Geogrid Reinforcement per ASTM D6637 in WSDOT QPL (lbs/ft)	CR_u	RF	T_{ac} (lbs/ft)
UMESA3/ UX1400HS	UMESA6/ UX1700HS	4,820	1.0	3.6	1,340
UMESA4/ UX1500HS	UMESA6/ UX1700HS	7,880	1.0	3.5	2,250
UMESA5/ UX1600HS	UMESA6/ UX1700HS	9,870	1.0	3.4	2,900
UMESA6/ UX1700HS	UMESA6/ UX1700HS	12,200	0.91	3.3	3,360
UMESA3/ UX1400HS	UMESA3/ UX1400HS	4,820	0.85	3.6	1,140
UMESA4/ UX1500HS	UMESA4/ UX1500HS	7,880	0.79	3.5	1,780
UMESA5/ UX1600HS	UMESA5/ UX1600HS	9,870	0.87	3.4	2,530
UMESA6/ UX1700HS	UMESA6/ UX1700HS	12,200	0.91	3.3	3,360

Table 15-(Tensar ARES)-1 Approved connection strength design values for Tensar ARES walls.

T_{ac}, the long-term connection strength, shall be calculated as follows for the Tensar ARES wall:

$$T_{ac} = \frac{T_{MARV} \bullet CR_u}{RF} \qquad \text{(15-(Tensar ARES)-1)}$$

where,

$$RF = RF_{ID} \times RF_{CR} \times RF_D$$

and,

T_{MARV} = the minimum average roll value for the ultimate geosynthetic strength T_{ult},

CR_u = the ultimate connection strength $T_{ultconn}$ divided by the lot specific ultimate tensile strength, T_{lot} (i.e., the lot of material specific to the connection testing),

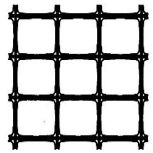
RF_{ID} = reduction factor for installation damage,

RF_{CR} = creep reduction factor for the geosynthetic, and

RF_D = the durability reduction factor for the geosynthetic.

Approved details for the Tensar ARES wall system are provided in the following plan sheets. Exceptions and additional requirements regarding these approved details are as follows:

- For all plan sheets, the full height panel details are not preapproved. Full height panels may be used by special design, with the approval of the State Bridge Design Engineer and the State Geotechnical Engineer, provided a complete wall design with detailed plans are developed and included in the construction contract (i.e., full height panel walls shall not be submitted as shop drawings in design-bid-build projects).
- In plan sheet 3 of 19, there should be a minimum cover of 4 inches of soil between the geogrid and the traffic barrier reaction slab.
- In plan sheet 8 of 19, the strength of the geogrid and connection available shall be reduced by 10% to account for the skew of the geogrid reinforcement. The skew angle relative to the perpendicular from the wall face shall be no more than 10^{o}.
- In plan sheets 10 and 14 of 19, regarding the filter fabric shown, WSDOT reserves the right to require the use WSDOT Standard Specification materials as specified in Standard Specification Section 9-33 that are similar to those specified in this plan sheet.
- In plan sheet 15 of 19, the guard rail detail, the guard rail post shall either be installed through precut holes in the geogrid layers that must penetrated, or the geogrid layers shall be cut in a manner that prevents ripping or tearing of the geogrid.



Tensar®

CONSTRUCTION DRAWINGS
Prepared For

STATE OF WASHINGTON
DEPARTMENT OF TRANSPORTATION

STANDARD ARES PRECAST PANEL RETAINING WALL DETAILS

INDEX

SHEET	DESCRIPTION
1.	Title Sheet
2.	ARES Retaining Wall Construction Requirements
3.	ARES Articulated Panel Cross-Section
4.	ARES Full Height Panel Cross-Section
5.	ARES Articulated Panels
6.	ARES Full Height Panels
7.	Corner/Slip Joint Elements
8.	Geogrid Panel Connection

INDEX

SHEET	DESCRIPTION
9.	Geogrid Panel Connection
10.	ARES Articulated Panel Leveling Pad
11.	ARES Full Height Panel Leveling Pad
12.	Panel Coping
13.	Panel Coping
14.	Obstructions
15.	Typical Details
16.	32 Inch Type "F" Traffic Barrier Standard
17.	32 Inch Type "F" Traffic Barrier Standard
18.	42 Inch Type "F" Traffic Barrier Standard
19.	42 Inch Type "F" Traffic Barrier Standard

SHEET01.DWG

Tensar®
Tensar Earth Technologies, Inc.
5883 Glenridge Drive, Suite 200
Atlanta, Georgia 30328
(404) 250-1290

(BAR)

REVISIONS \ ISSUE		
0	8/8/04	ISSUED FOR REVIEW

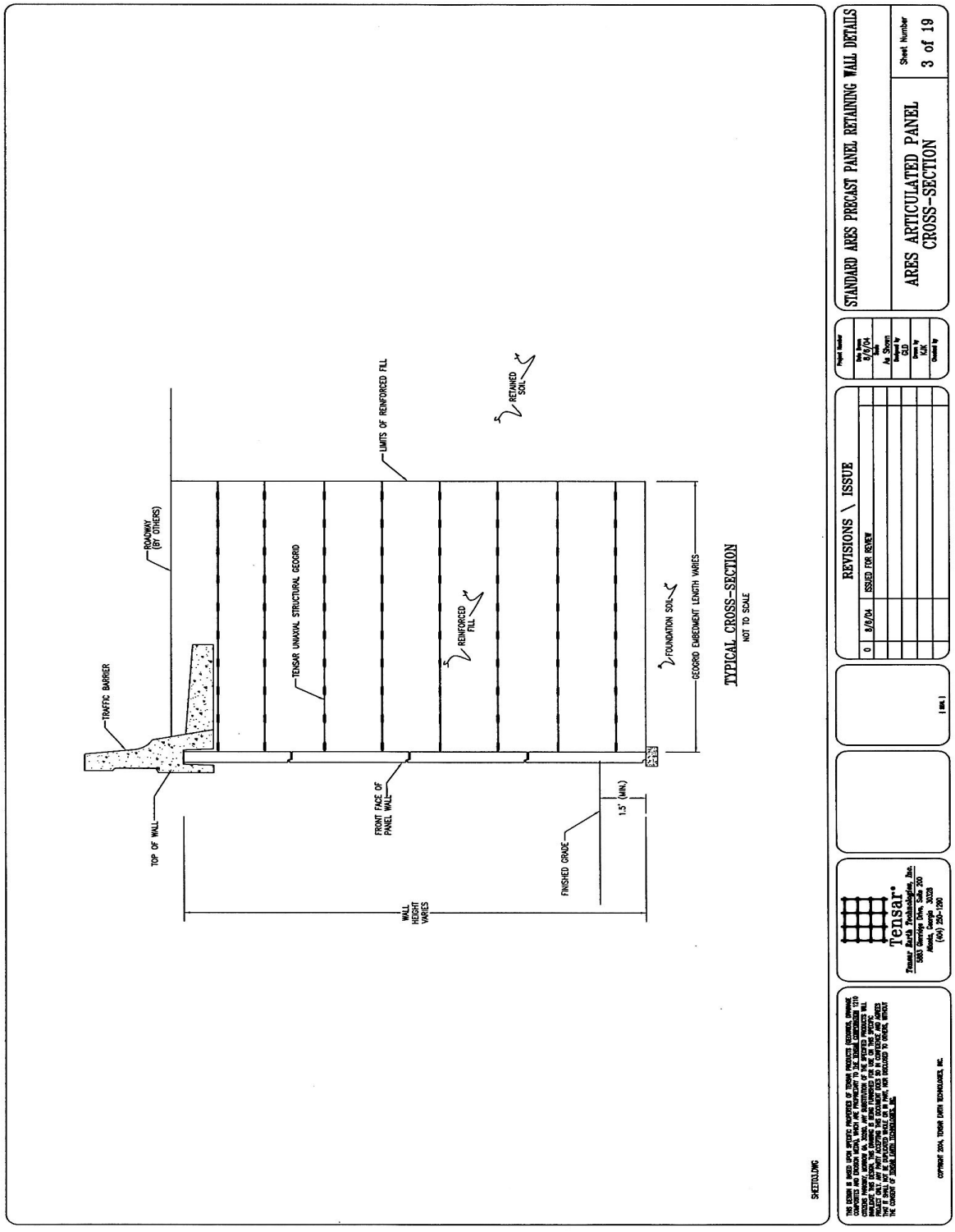
Project Number
Date Drawn 8/8/04
Scale As Shown
Designed by CBK
Drawn by KJK
Checked by

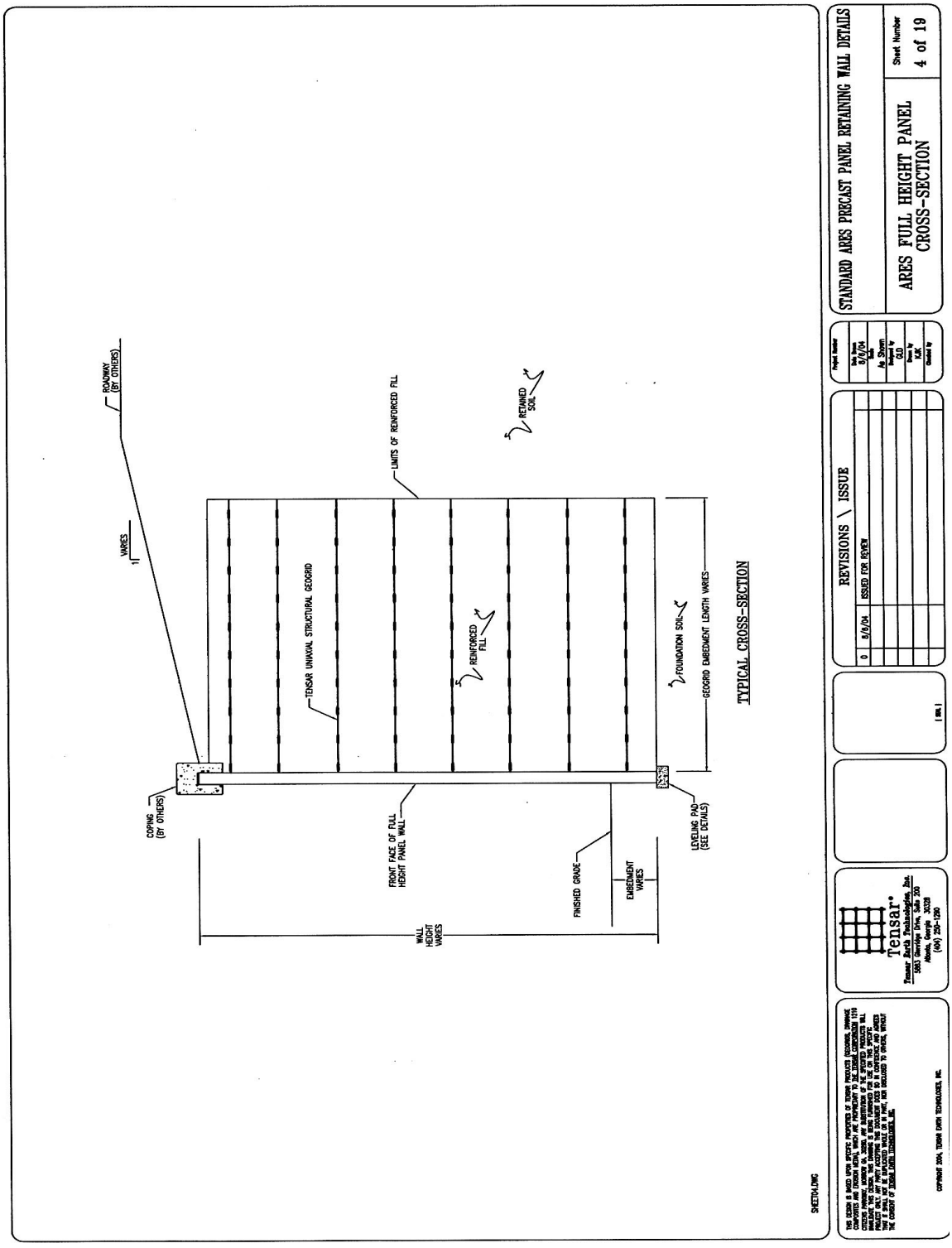
STANDARD ARES PRECAST PANEL RETAINING WALL DETAILS

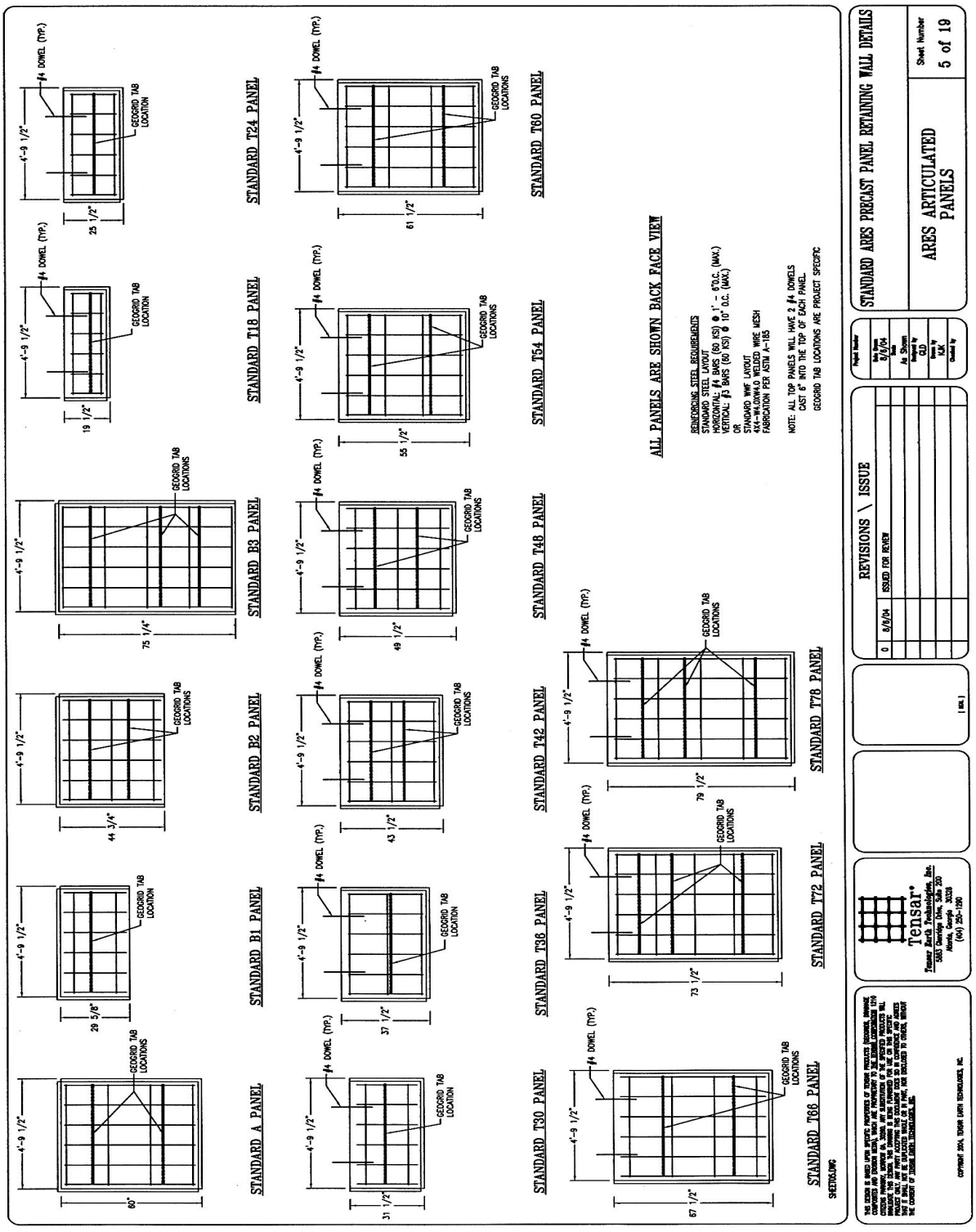
TITLE SHEET

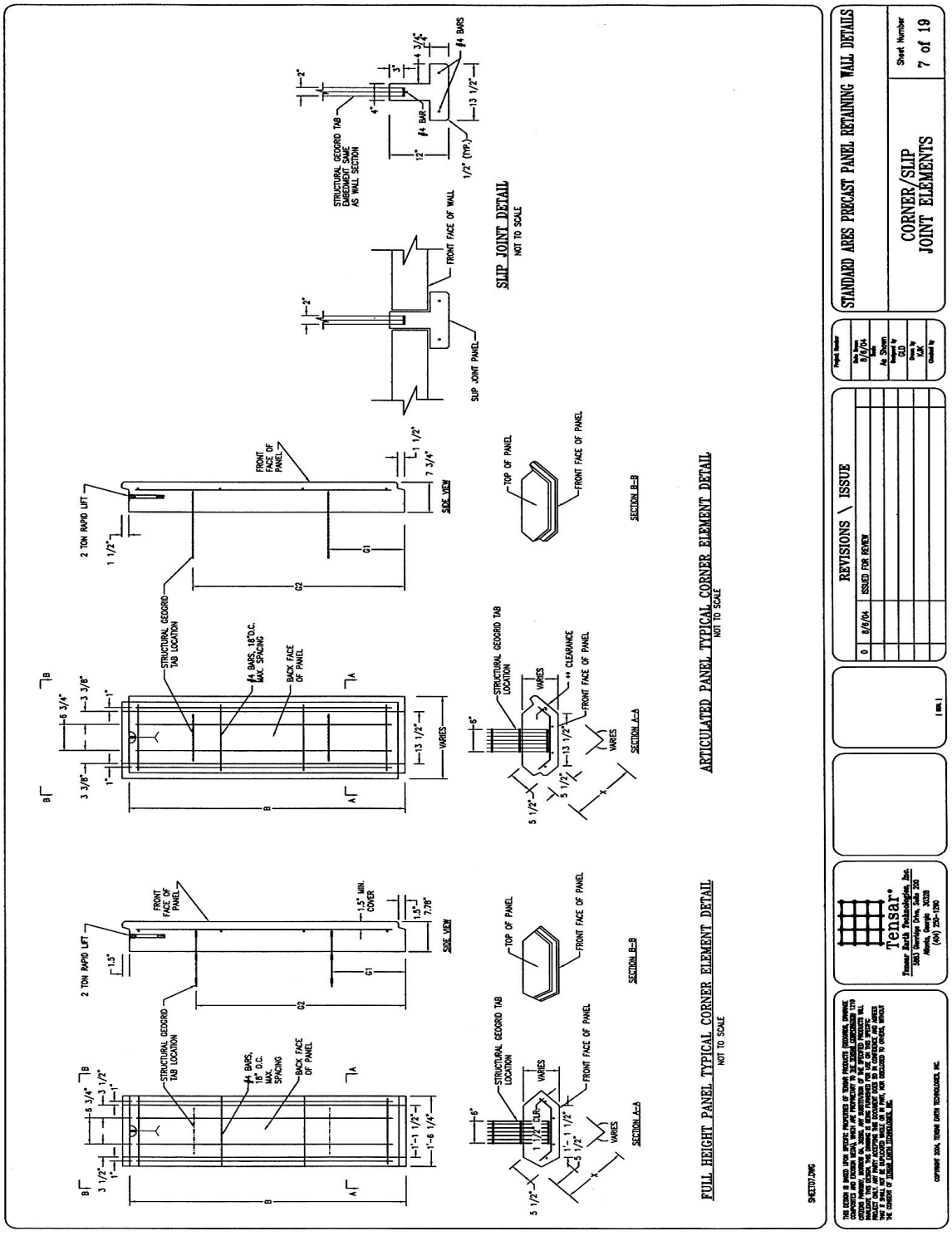
Sheet Number 1 of 19

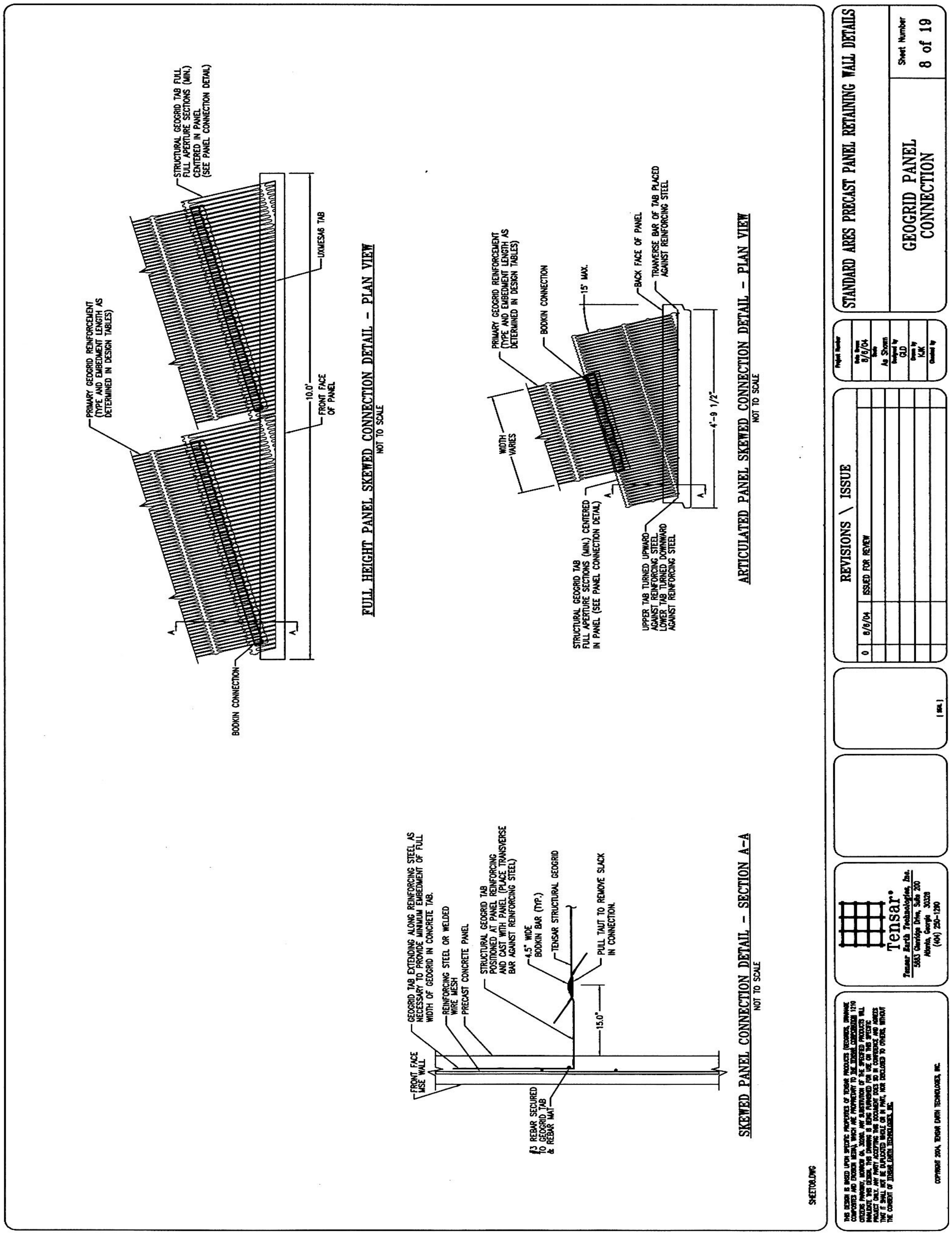
Appendix 15 (Tensar ARES Wall)

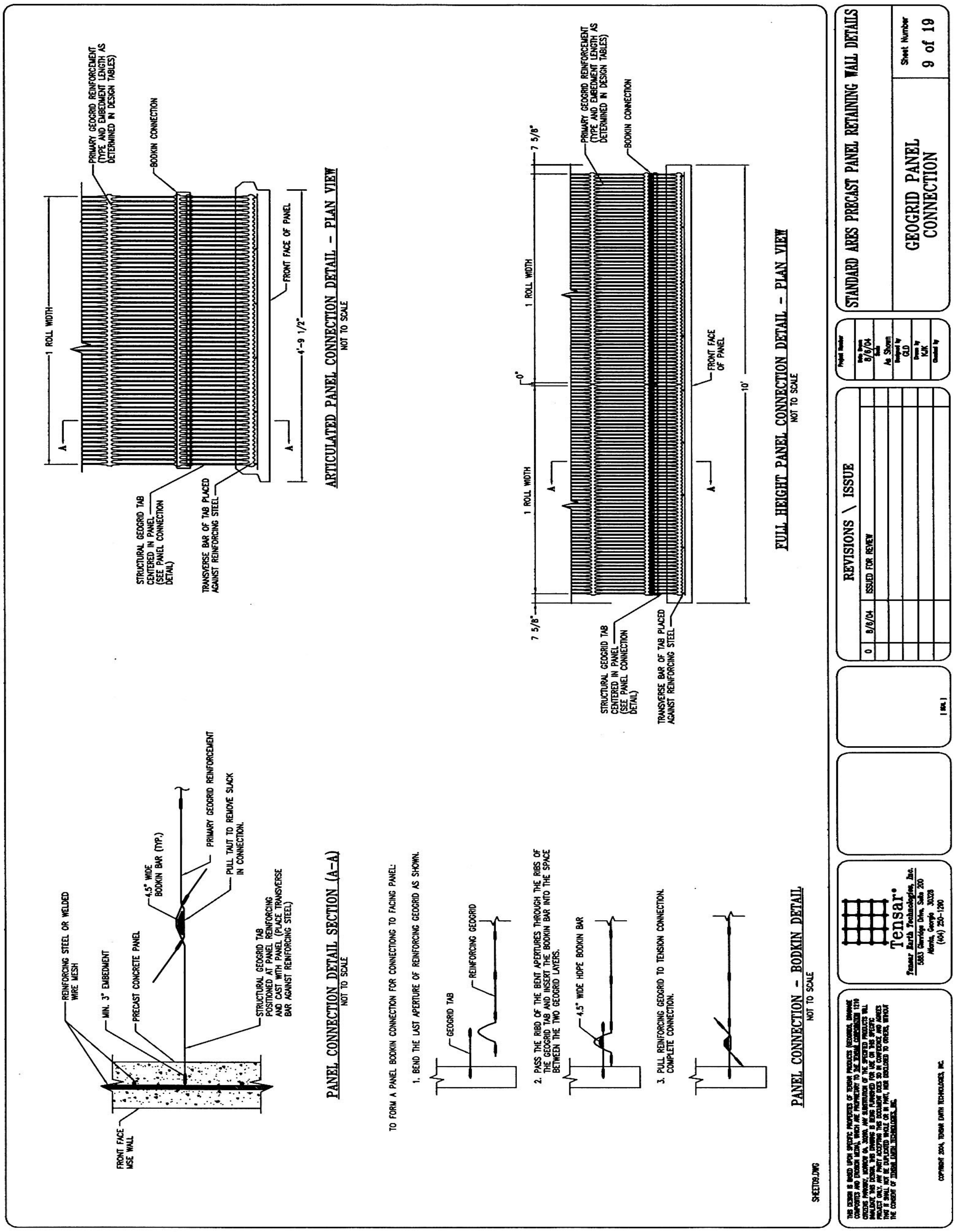

TYPICAL CROSS-SECTION
NOT TO SCALE
ROADWAY (BY OTHERS)
TRAFFIC BARRIER
TOP OF WALL
TENSAR UNIAXIAL STRUCTURAL GEOGRID
LIMITS OF REINFORCED FILL
RETAINED SOIL
REINFORCED FILL
FOUNDATION SOIL
GEOGRID EMBEDMENT LENGTH VARIES
FRONT FACE OF PANEL WALL
1.5' (MIN.)
FINISHED GRADE
WALL HEIGHT VARIES
REVISIONS \ ISSUE
0 9/9/04 ISSUED FOR REVIEW
Tensar
STANDARD ARES PRECAST PANEL RETAINING WALL DETAILS
ARES ARTICULATED PANEL CROSS-SECTION
Sheet Number 3 of 19

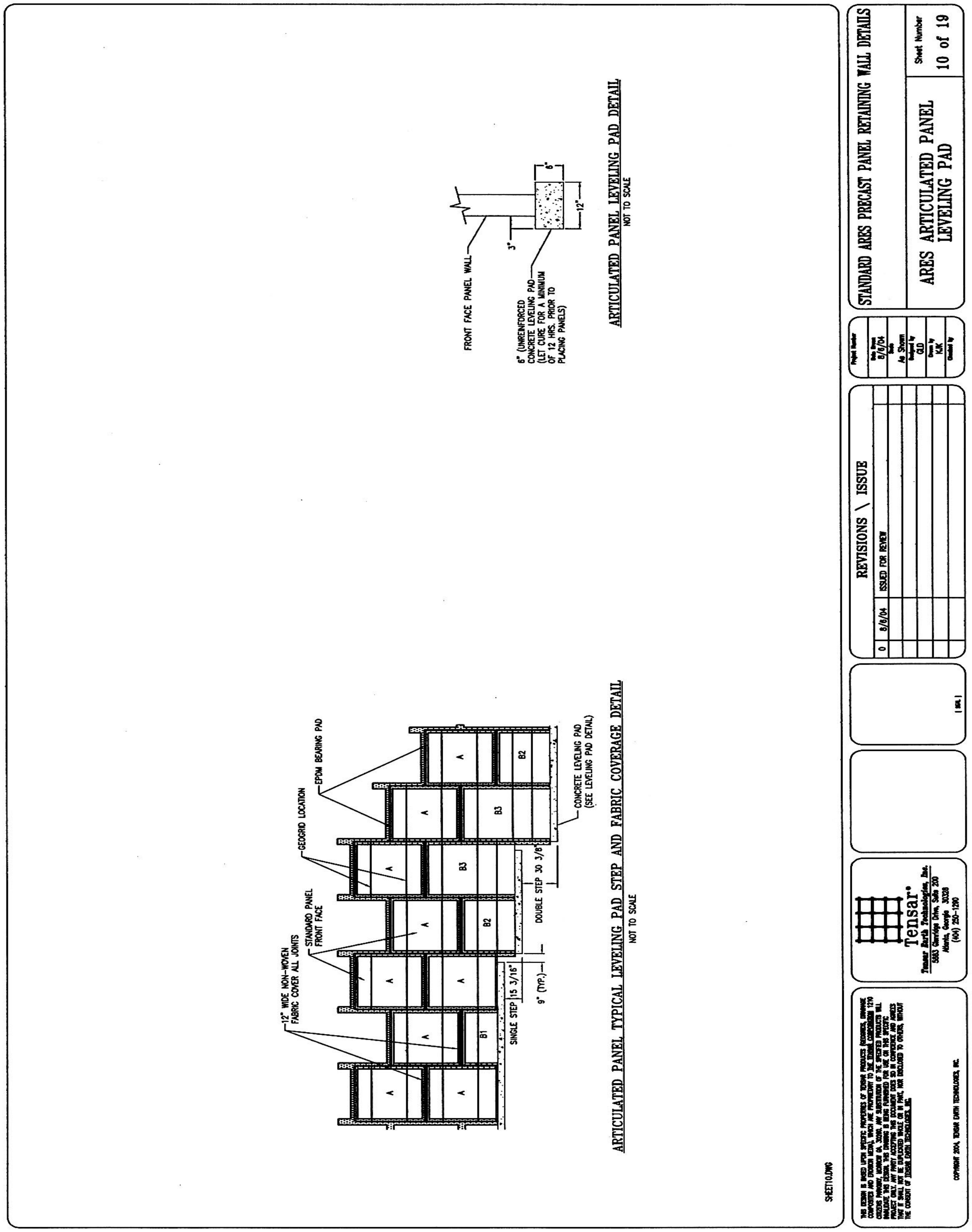

ROADWAY (BY OTHERS)
VARIES
LIMITS OF REINFORCED FILL
RETAINED SOIL
TENSAR UNIAXIAL STRUCTURAL GEOGRID
REINFORCED FILL
FOUNDATION SOIL
GEOGRID EMBEDMENT LENGTH VARIES
COPING (BY OTHERS)
FRONT FACE OF FULL HEIGHT PANEL WALL
FINISHED GRADE
EMBEDMENT VARIES
LEVELING PAD (SEE DETAILS)
WALL HEIGHT VARIES
TYPICAL CROSS-SECTION
REVISIONS \ ISSUE
0 8/9/04 ISSUED FOR REVIEW
STANDARD ARES PRECAST PANEL RETAINING WALL DETAILS
ARES FULL HEIGHT PANEL CROSS-SECTION
Sheet Number 4 of 19
Tensar
Tensar Earth Technologies, Inc.
5883 Glenridge Drive, Suite 200
Atlanta, Georgia 30328
(404) 250-1290
SHEET4.DWG

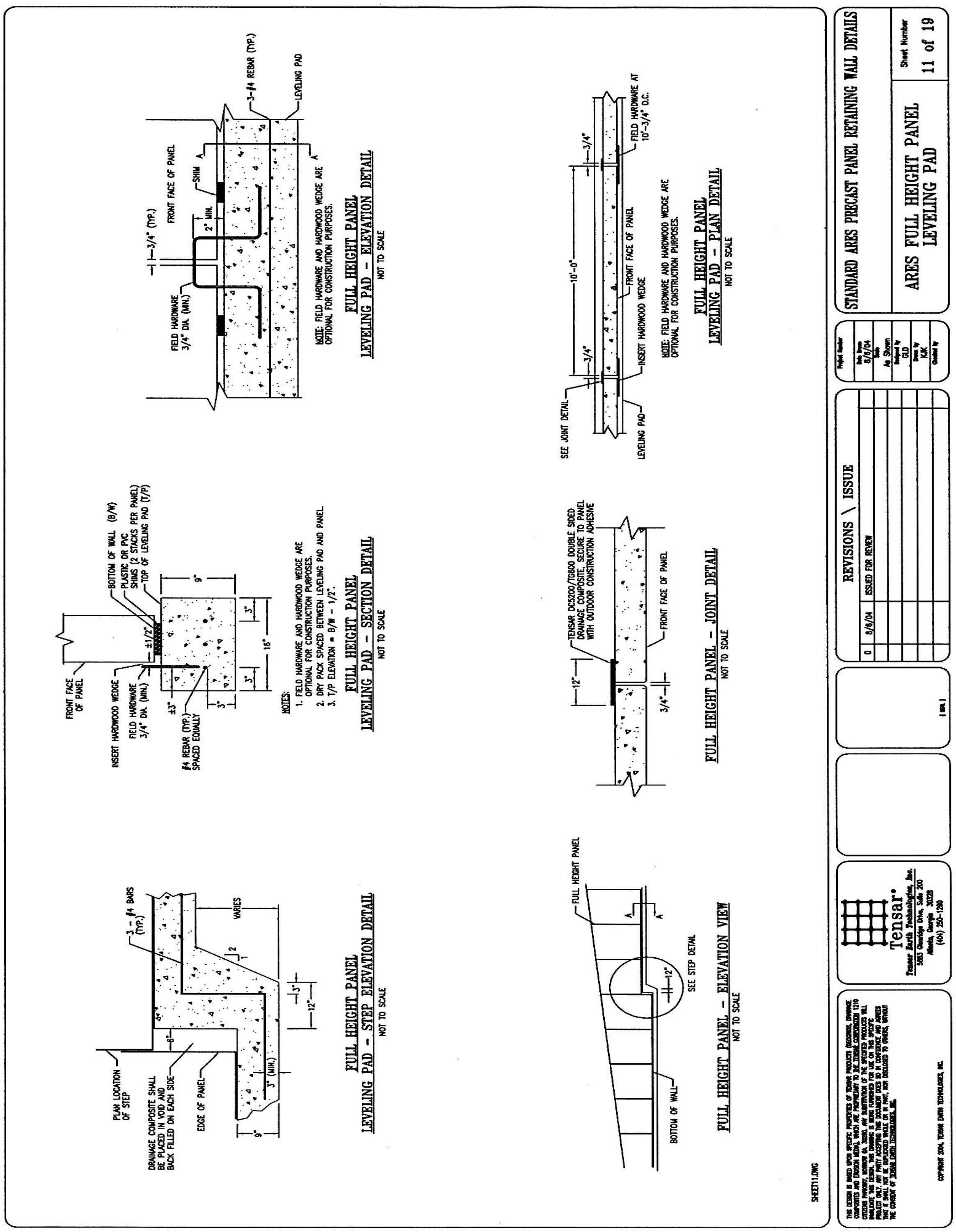

STANDARD A PANEL
STANDARD B1 PANEL
STANDARD B2 PANEL
STANDARD B3 PANEL
STANDARD T18 PANEL
STANDARD T24 PANEL
STANDARD T30 PANEL
STANDARD T36 PANEL
STANDARD T42 PANEL
STANDARD T48 PANEL
STANDARD T54 PANEL
STANDARD T60 PANEL
STANDARD T66 PANEL
STANDARD T72 PANEL
STANDARD T78 PANEL
ALL PANELS ARE SHOWN BACK FACE VIEW
REINFORCING STEEL REQUIREMENTS
STANDARD STEEL LAYOUT
HORIZONTAL: #4 BARS (60 KSI) @ 1' - 6"O.C. (MAX.)
VERTICAL: #3 BARS (60 KSI) @ 10" O.C. (MAX.)
OR
STANDARD WWF LAYOUT
4X4-W4.0XW4.0 WELDED WIRE MESH
FABRICATION PER ASTM A-185
NOTE: ALL TOP PANELS WILL HAVE 2 #4 DOWELS
CAST 6" INTO THE TOP OF EACH PANEL.
GEOGRID TAB LOCATIONS ARE PROJECT SPECIFIC
REVISIONS \ ISSUE
0 8/8/04 ISSUED FOR REVIEW
STANDARD ARES PRECAST PANEL RETAINING WALL DETAILS
ARES ARTICULATED PANELS
Sheet Number 5 of 19
SHEET4.DWG
Tensar
Tensar Earth Technologies, Inc.
5883 Glenridge Drive, Suite 200
Atlanta, Georgia 30328
(404) 250-1269

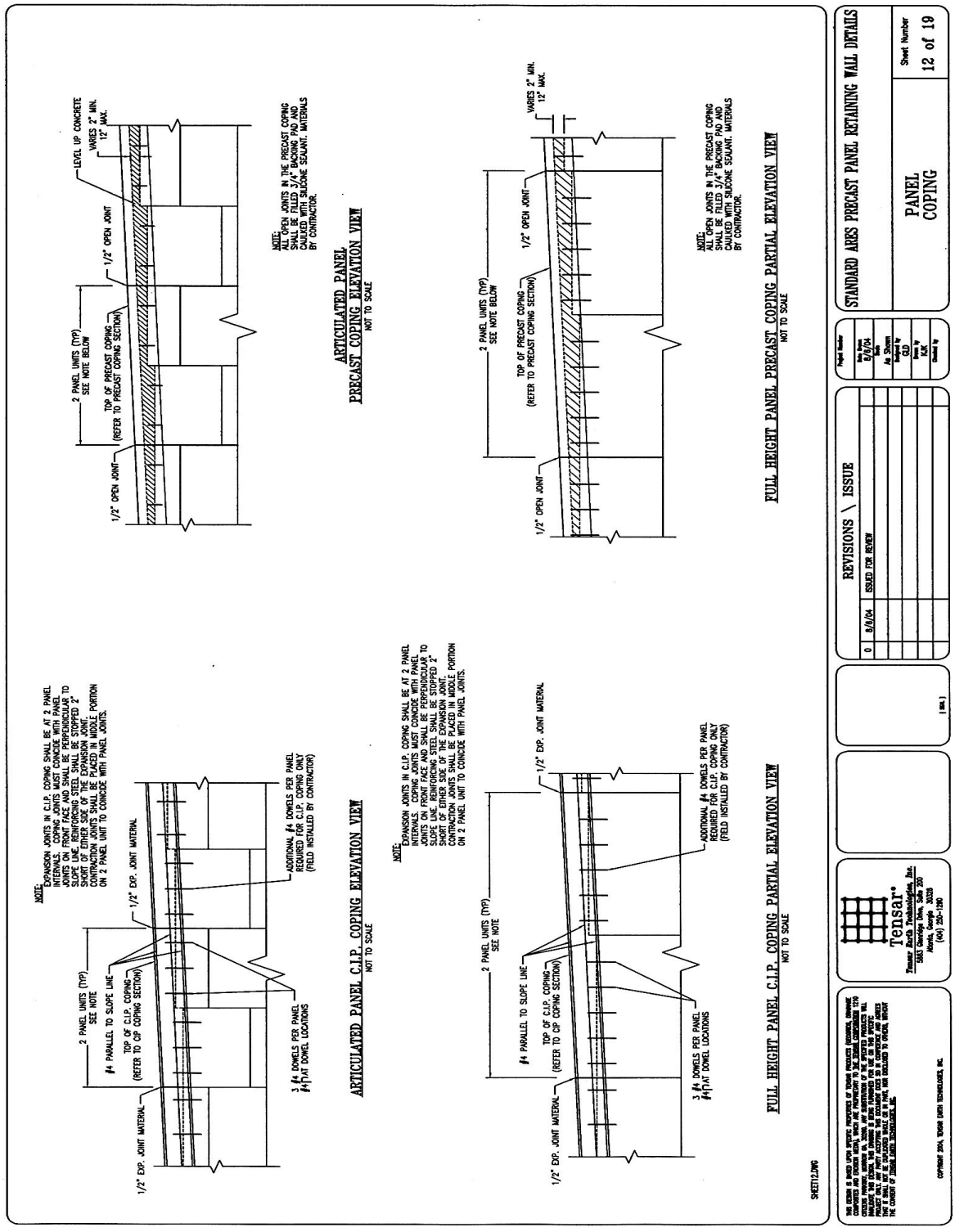

SLIP JOINT DETAIL
NOT TO SCALE
ARTICULATED PANEL TYPICAL CORNER ELEMENT DETAIL
NOT TO SCALE
FULL HEIGHT PANEL TYPICAL CORNER ELEMENT DETAIL
NOT TO SCALE
REVISIONS \ ISSUE
ISSUED FOR REVIEW
STANDARD ARES PRECAST PANEL RETAINING WALL DETAILS
CORNER/SLIP
JOINT ELEMENTS
Sheet Number
7 of 19
Tensar

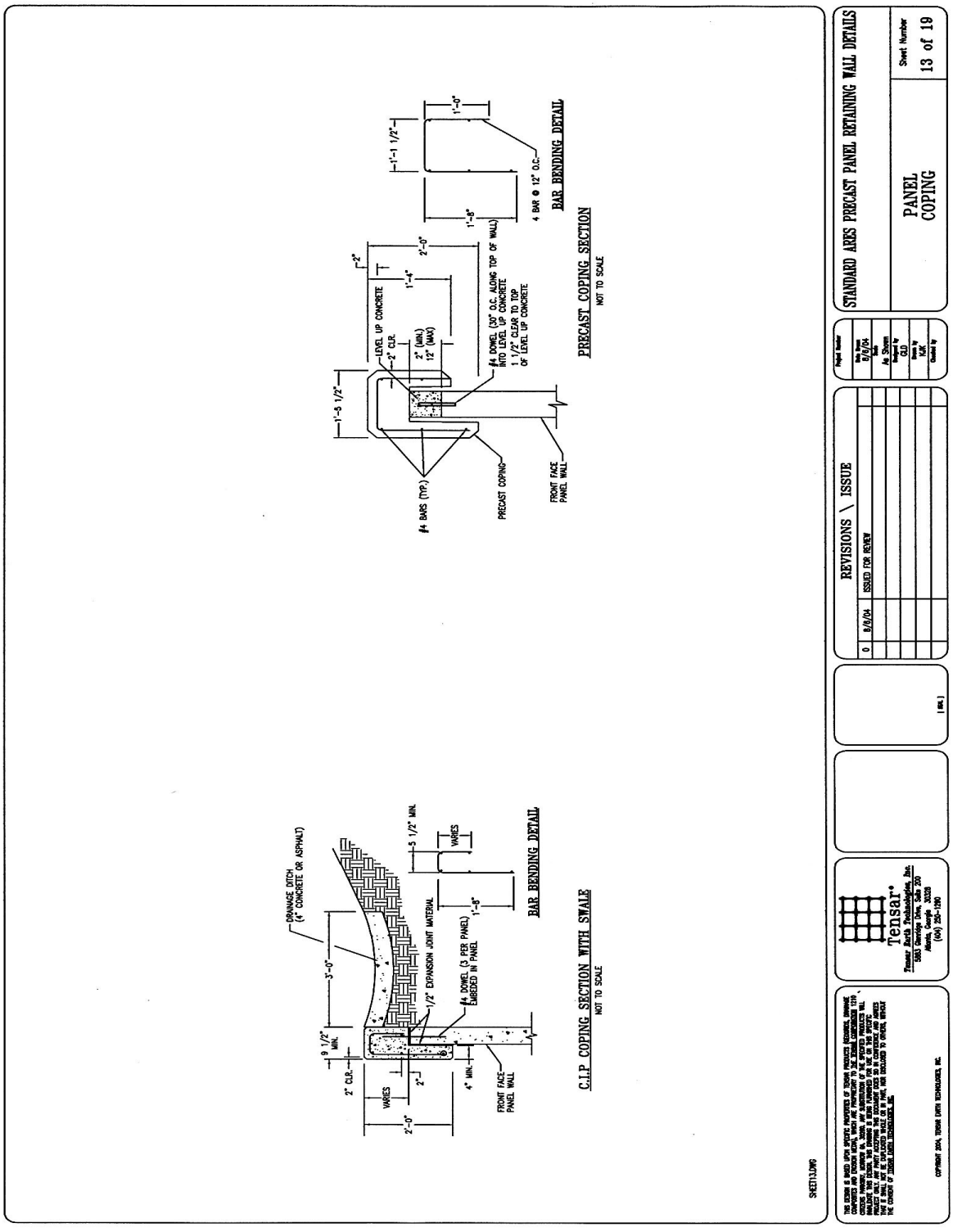

FULL HEIGHT PANEL SKEWED CONNECTION DETAIL – PLAN VIEW
NOT TO SCALE
PRIMARY GEOGRID REINFORCEMENT (TYPE AND EMBEDMENT LENGTH AS DETERMINED IN DESIGN TABLES)
STRUCTURAL GEOGRID TAB FULL FULL APERTURE SECTIONS (MIN.) CENTERED IN PANEL (SEE PANEL CONNECTION DETAIL)
BODKIN CONNECTION
FRONT FACE OF PANEL
10.0"
ARTICULATED PANEL SKEWED CONNECTION DETAIL – PLAN VIEW
NOT TO SCALE
BODKIN CONNECTION
15° MAX.
BACK FACE OF PANEL
TRANVERSE BAR OF TAB PLACED AGAINST REINFORCING STEEL
WIDTH VARIES
4'-9 1/2"
STRUCTURAL GEOGRID TAB FULL APERTURE SECTIONS (MIN.) CENTERED IN PANEL (SEE PANEL CONNECTION DETAIL)
UPPER TAB TURNED UPWARD AGAINST REINFORCING STEEL. LOWER TAB TURNED DOWNWARD AGAINST REINFORCING STEEL
SKEWED PANEL CONNECTION DETAIL – SECTION A-A
NOT TO SCALE
FRONT FACE MSE WALL
#3 REBAR SECURED TO GEOGRID TAB & REBAR MAT
GEOGRID TAB EXTENDING ALONG REINFORCING STEEL AS NECESSARY TO PROVIDE MINIMUM EMBEDMENT OF FULL WIDTH OF GEOGRID IN CONCRETE TAB.
REINFORCING STEEL OR WELDED WIRE MESH
PRECAST CONCRETE PANEL
STRUCTURAL GEOGRID TAB POSITIONED AT PANEL REINFORCING AND CAST WITH PANEL (PLACE TRANSVERSE BAR AGAINST REINFORCING STEEL)
4.5" WIDE BODKIN BAR (TYP.)
TENSAR STRUCTURAL GEOGRID
PULL TAUT TO REMOVE SLACK IN CONNECTION.
15.0"
SHEET08.DWG
Tensar
REVISIONS \ ISSUE
0 8/6/04 ISSUED FOR REVIEW
STANDARD ARES PRECAST PANEL RETAINING WALL DETAILS
GEOGRID PANEL CONNECTION
Sheet Number
8 of 19

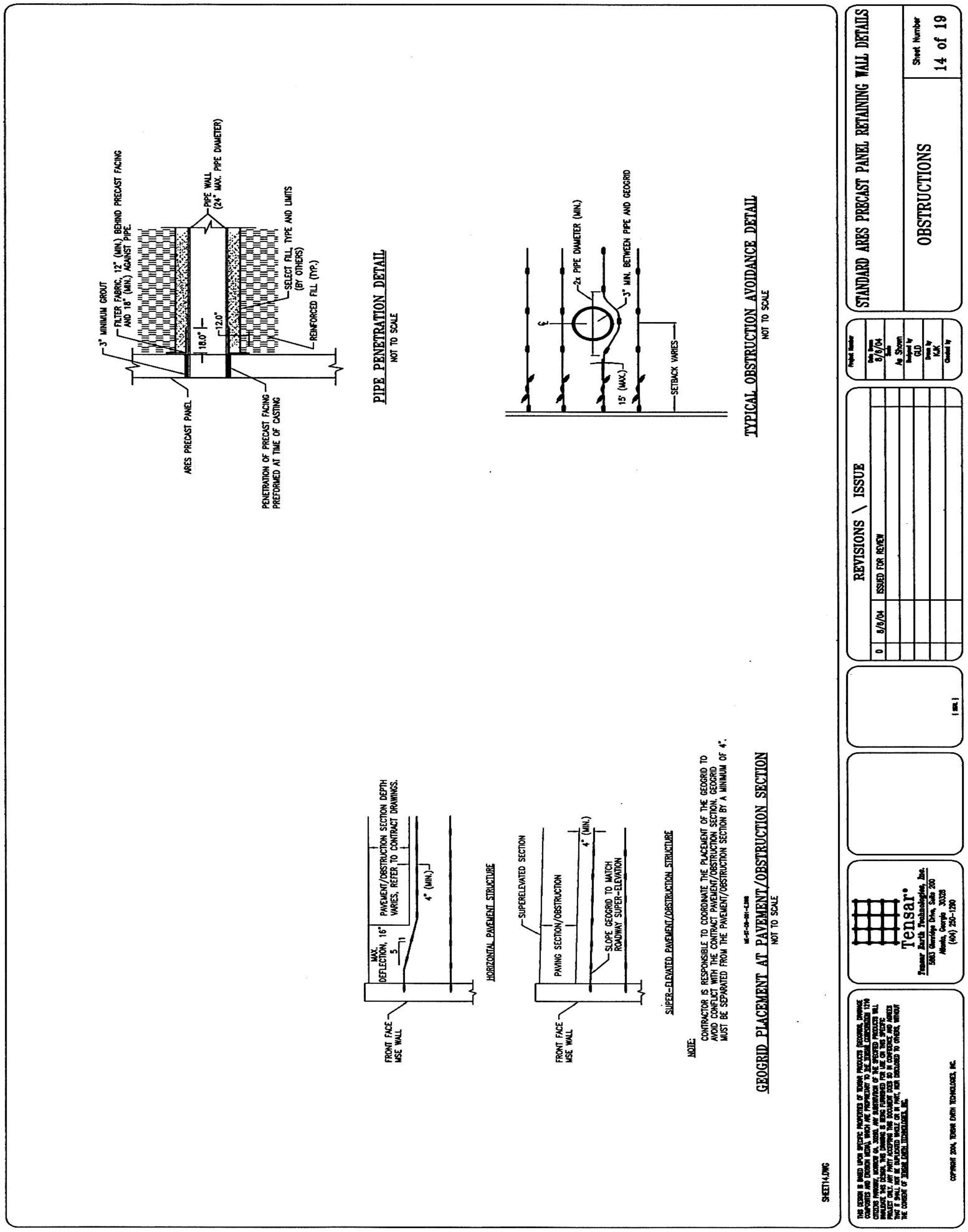

PRIMARY GEOGRID REINFORCEMENT (TYPE AND EMBEDMENT LENGTH AS DETERMINED IN DESIGN TABLES)
BODKIN CONNECTION
1 ROLL WIDTH
FRONT FACE OF PANEL
4'-9 1/2"
STRUCTURAL GEOGRID TAB CENTERED IN PANEL (SEE PANEL CONNECTION DETAIL)
TRANSVERSE BAR OF TAB PLACED AGAINST REINFORCING STEEL
ARTICULATED PANEL CONNECTION DETAIL – PLAN VIEW
NOT TO SCALE
7 5/8"
0"
10'
FRONT FACE OF PANEL
FULL HEIGHT PANEL CONNECTION DETAIL – PLAN VIEW
NOT TO SCALE
REINFORCING STEEL OR WELDED WIRE MESH
MIN. 3" EMBEDMENT
PRECAST CONCRETE PANEL
4.5" WIDE BODKIN BAR (TYP.)
PRIMARY GEOGRID REINFORCEMENT
PULL TAUT TO REMOVE SLACK IN CONNECTION.
STRUCTURAL GEOGRID TAB POSITIONED AT PANEL REINFORCING AND CAST WITH PANEL (PLACE TRANSVERSE BAR AGAINST REINFORCING STEEL)
FRONT FACE MSE WALL
PANEL CONNECTION DETAIL SECTION (A-A)
NOT TO SCALE
TO FORM A PANEL BODKIN CONNECTION FOR CONNECTING TO FACING PANEL:
1. BEND THE LAST APERTURE OF REINFORCING GEOGRID AS SHOWN.
GEOGRID TAB
REINFORCING GEOGRID
2. PASS THE RIBD OF THE BENT APERTURES THROUGH THE RIBS OF THE GEOGRID TAB AND INSERT THE BODKIN BAR INTO THE SPACE BETWEEN THE TWO GEOGRID LAYERS.
4.5" WIDE HDPE BODKIN BAR
3. PULL REINFORCING GEOGRID TO TENSION CONNECTION. COMPLETE CONNECTION.
PANEL CONNECTION – BODKIN DETAIL
NOT TO SCALE
SHEET09.DWG
Tensar
Tensar Earth Technologies, Inc.
5883 Glenridge Drive, Suite 200
Atlanta, Georgia 30328
(404) 250-1290
COPYRIGHT 2004, TENSAR EARTH TECHNOLOGIES, INC.
REVISIONS \ ISSUE
0 | 8/8/04 | ISSUED FOR REVIEW
8/8/04
As Shown
CLD
KJK
STANDARD ARES PRECAST PANEL RETAINING WALL DETAILS
GEOGRID PANEL CONNECTION
Sheet Number
9 of 19


12" WIDE NON-WOVEN FABRIC COVER ALL JOINTS
STANDARD PANEL FRONT FACE
GEOGRID LOCATION
EPDM BEARING PAD
SINGLE STEP 15 3/16"
9" (TYP.)
DOUBLE STEP 30 3/8"
CONCRETE LEVELING PAD (SEE LEVELING PAD DETAIL)
ARTICULATED PANEL TYPICAL LEVELING PAD STEP AND FABRIC COVERAGE DETAIL
NOT TO SCALE
FRONT FACE PANEL WALL
3"
6" (UNREINFORCED CONCRETE LEVELING PAD (LET CURE FOR A MINIMUM OF 12 HRS. PRIOR TO PLACING PANELS)
6"
12"
ARTICULATED PANEL LEVELING PAD DETAIL
NOT TO SCALE
SHEET10.DWG
COPYRIGHT 2004, TENSAR EARTH TECHNOLOGIES, INC.
Tensar
Tensar Earth Technologies, Inc.
5883 Glenridge Drive, Suite 200
Atlanta, Georgia 30328
(404) 250-1290
REVISIONS \ ISSUE
0 8/8/04 ISSUED FOR REVIEW
8/8/04
As Shown
GLD
KJK
STANDARD ARES PRECAST PANEL RETAINING WALL DETAILS
ARES ARTICULATED PANEL LEVELING PAD
Sheet Number
10 of 19

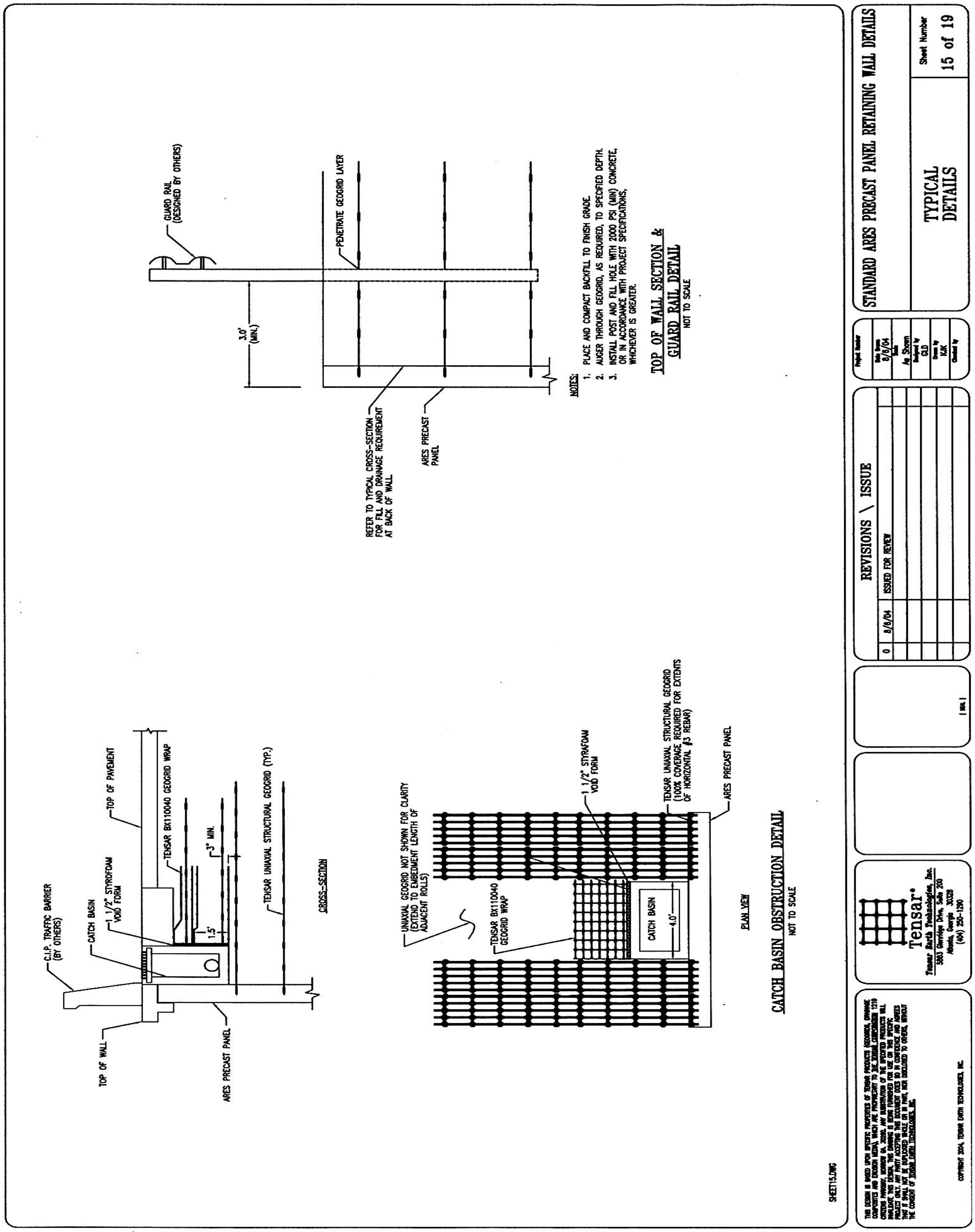

FULL HEIGHT PANEL
LEVELING PAD – ELEVATION DETAIL
NOT TO SCALE
NOTE: FIELD HARDWARE AND HARDWOOD WEDGE ARE OPTIONAL FOR CONSTRUCTION PURPOSES.
FULL HEIGHT PANEL
LEVELING PAD – PLAN DETAIL
NOT TO SCALE
FULL HEIGHT PANEL
LEVELING PAD – SECTION DETAIL
NOT TO SCALE
NOTES:
1. FIELD HARDWARE AND HARDWOOD WEDGE ARE OPTIONAL FOR CONSTRUCTION PURPOSES.
2. DRY PACK SPACED BETWEEN LEVELING PAD AND PANEL.
3. T/P ELEVATION = B/W – 1/2".
FULL HEIGHT PANEL – JOINT DETAIL
NOT TO SCALE
FULL HEIGHT PANEL
LEVELING PAD – STEP ELEVATION DETAIL
NOT TO SCALE
FULL HEIGHT PANEL – ELEVATION VIEW
NOT TO SCALE
STANDARD ARES PRECAST PANEL RETAINING WALL DETAILS
ARES FULL HEIGHT PANEL
LEVELING PAD
Sheet Number
11 of 19
REVISIONS \ ISSUE
0
8/8/04
ISSUED FOR REVIEW
Tensar
SHEET11.DWG

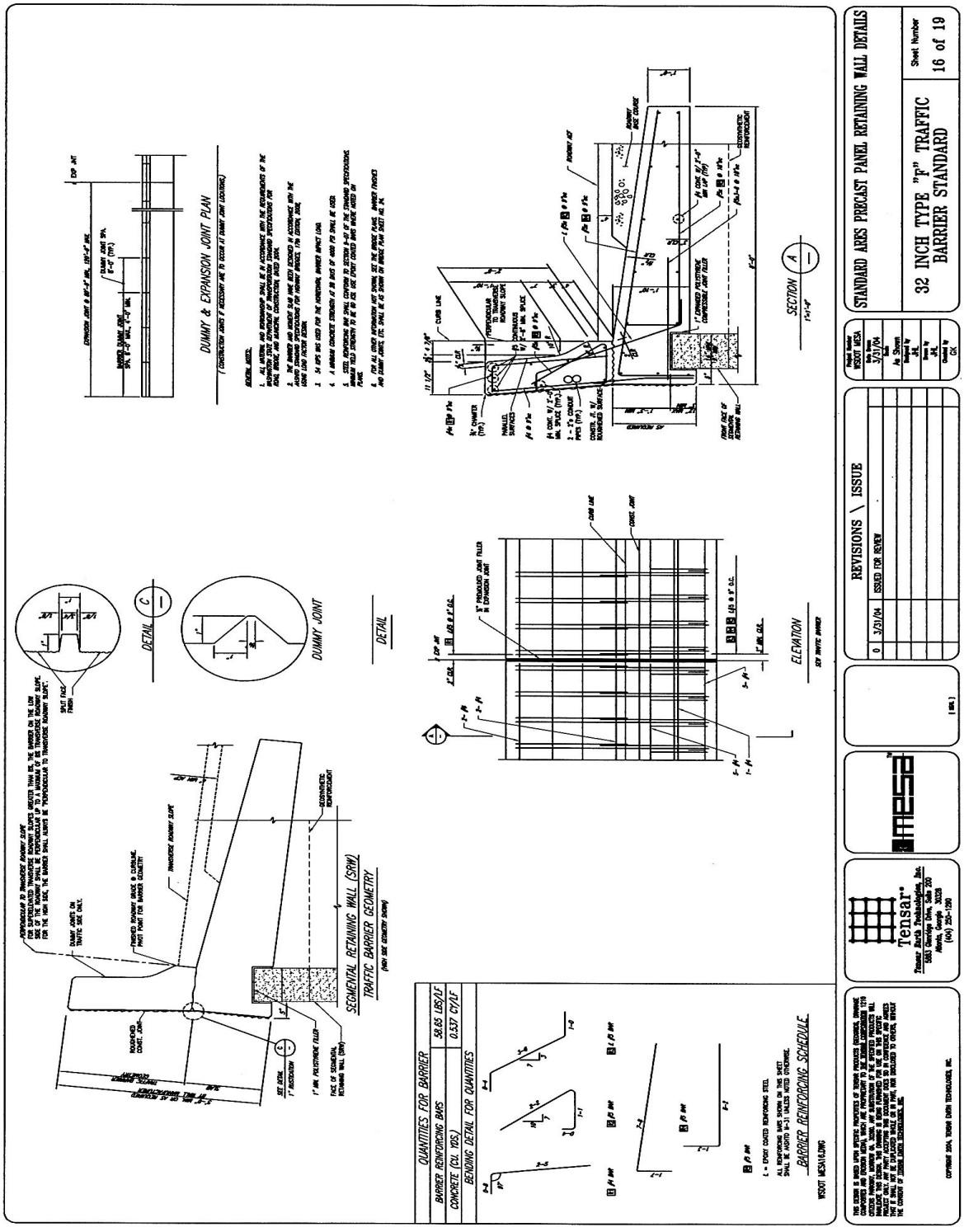

NOTE:
EXPANSION JOINTS IN C.I.P. COPING SHALL BE AT 2 PANEL INTERVALS. COPING JOINTS MUST COINCIDE WITH PANEL JOINTS ON FRONT FACE AND SHALL BE PERPENDICULAR TO SLOPE LINE. REINFORCING STEEL SHALL BE STOPPED 2" SHORT OF EITHER SIDE OF THE EXPANSION JOINT. CONTRACTION JOINTS SHALL BE PLACED IN MIDDLE PORTION ON 2 PANEL UNIT TO COINCIDE WITH PANEL JOINTS.
2 PANEL UNITS (TYP) SEE NOTE
#4 PARALLEL TO SLOPE LINE
TOP OF C.I.P. COPING (REFER TO CIP COPING SECTION)
1/2" EXP. JOINT MATERIAL
1/2" EXP. JOINT MATERIAL
3 #4 DOWELS PER PANEL #4 TIAT DOWEL LOCATIONS
ADDITIONAL #4 DOWELS PER PANEL REQUIRED FOR C.I.P. COPING ONLY (FIELD INSTALLED BY CONTRACTOR)
ARTICULATED PANEL C.I.P. COPING ELEVATION VIEW
NOT TO SCALE
2 PANEL UNITS (TYP) SEE NOTE BELOW
TOP OF PRECAST COPING (REFER TO PRECAST COPING SECTION)
1/2" OPEN JOINT
1/2" OPEN JOINT
LEVEL UP CONCRETE
VARIES 2" MIN. 12" MAX.
NOTE:
ALL OPEN JOINTS IN THE PRECAST COPING SHALL BE FILLED 3/4" BACKING PAD AND CAULKED WITH SILICONE SEALANT. MATERIALS BY CONTRACTOR.
ARTICULATED PANEL
PRECAST COPING ELEVATION VIEW
NOT TO SCALE
NOTE
EXPANSION JOINTS IN C.I.P. COPING SHALL BE AT 2 PANEL INTERVALS. COPING JOINTS MUST COINCIDE WITH PANEL JOINTS ON FRONT FACE AND SHALL BE PERPENDICULAR TO SLOPE LINE. REINFORCING STEEL SHALL BE STOPPED 2" SHORT OF EITHER SIDE OF THE EXPANSION JOINT. CONTRACTION JOINTS SHALL BE PLACED IN MIDDLE PORTION ON 2 PANEL UNIT TO COINCIDE WITH PANEL JOINTS.
2 PANEL UNITS (TYP) SEE NOTE
#4 PARALLEL TO SLOPE LINE
TOP OF C.I.P. COPING (REFER TO CIP COPING SECTION)
1/2" EXP. JOINT MATERIAL
1/2" EXP. JOINT MATERIAL
3 #4 DOWELS PER PANEL #4 TIAT DOWEL LOCATIONS
ADDITIONAL #4 DOWELS PER PANEL REQUIRED FOR C.I.P. COPING ONLY (FIELD INSTALLED BY CONTRACTOR)
FULL HEIGHT PANEL C.I.P. COPING PARTIAL ELEVATION VIEW
NOT TO SCALE
2 PANEL UNITS (TYP) SEE NOTE BELOW
TOP OF PRECAST COPING (REFER TO PRECAST COPING SECTION)
1/2" OPEN JOINT
1/2" OPEN JOINT
VARIES 2" MIN. 12" MAX.
NOTE:
ALL OPEN JOINTS IN THE PRECAST COPING SHALL BE FILLED 3/4" BACKING PAD AND CAULKED WITH SILICONE SEALANT. MATERIALS BY CONTRACTOR.
FULL HEIGHT PANEL PRECAST COPING PARTIAL ELEVATION VIEW
NOT TO SCALE
SHEET12.DWG
REVISIONS \ ISSUE
0 8/8/04 ISSUED FOR REVIEW
Project Number
Date Drawn 8/8/04
Scale As Shown
Drawn By CLD
Design By KJK
Checked By
STANDARD ARES PRECAST PANEL RETAINING WALL DETAILS
PANEL COPING
Sheet Number 12 of 19
Tensar
Tensar Earth Technologies, Inc.
5883 Glenridge Drive, Suite 200
Atlanta, Georgia 30328
(404) 250-1290
COPYRIGHT 2004, TENSAR EARTH TECHNOLOGIES, INC.

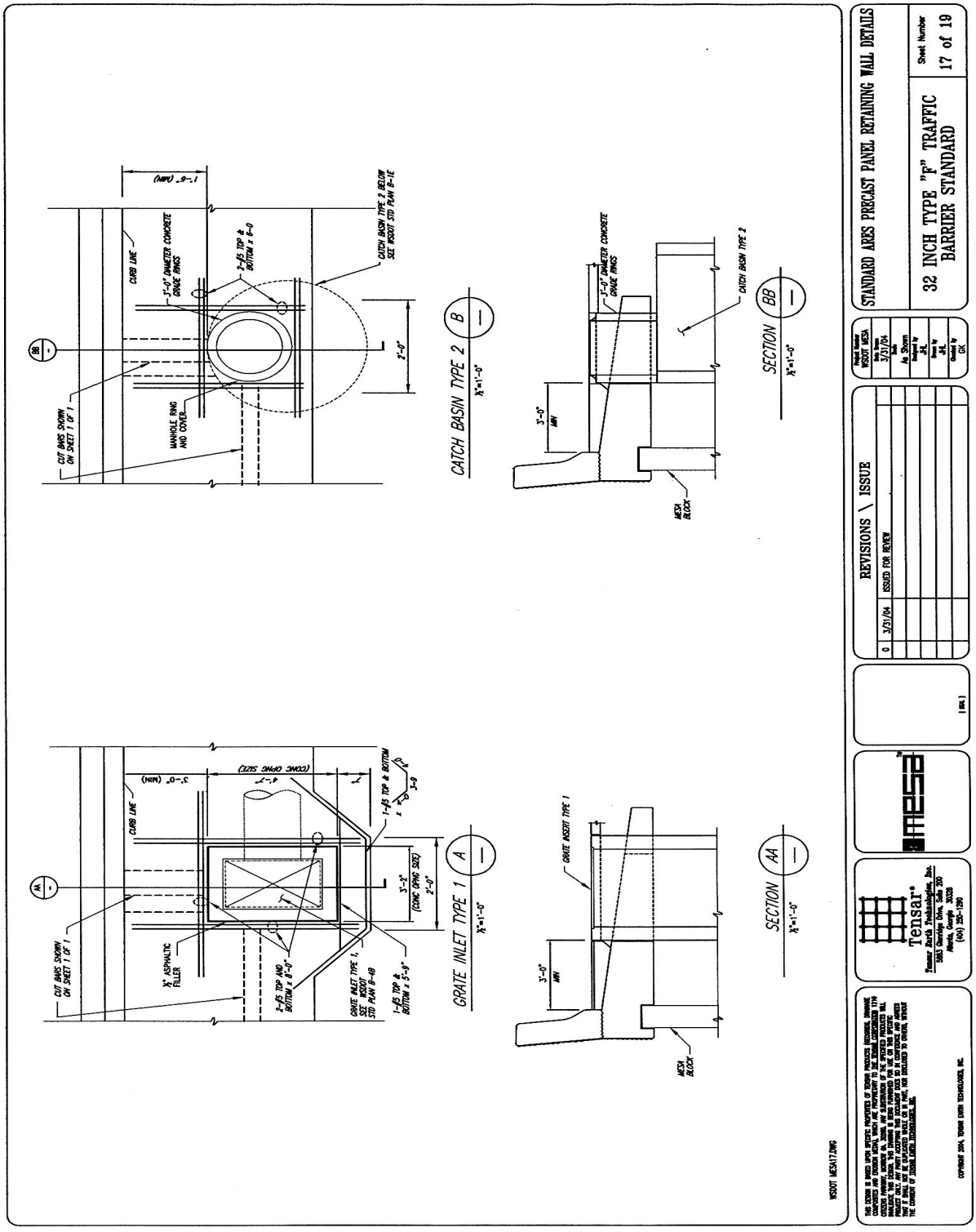

PRECAST COPING SECTION
NOT TO SCALE
LEVEL UP CONCRETE
2" CLR.
2" (MIN.)
12" (MAX)
#4 DOWEL (30" O.C. ALONG TOP OF WALL)
INTO LEVEL UP CONCRETE
1 1/2" CLEAR TO TOP
OF LEVEL UP CONCRETE
#4 BARS (TYP.)
PRECAST COPING
FRONT FACE
PANEL WALL
BAR BENDING DETAIL
4 BAR @ 12" O.C.
C.I.P COPING SECTION WITH SWALE
NOT TO SCALE
DRAINAGE DITCH
(4" CONCRETE OR ASPHALT)
1/2" EXPANSION JOINT MATERIAL
#4 DOWEL (3 PER PANEL)
EMBEDDED IN PANEL
FRONT FACE
PANEL WALL
BAR BENDING DETAIL
STANDARD ARES PRECAST PANEL RETAINING WALL DETAILS
PANEL
COPING
Sheet Number
13 of 19
REVISIONS \ ISSUE
ISSUED FOR REVIEW
Tensar
SKET13.DWG

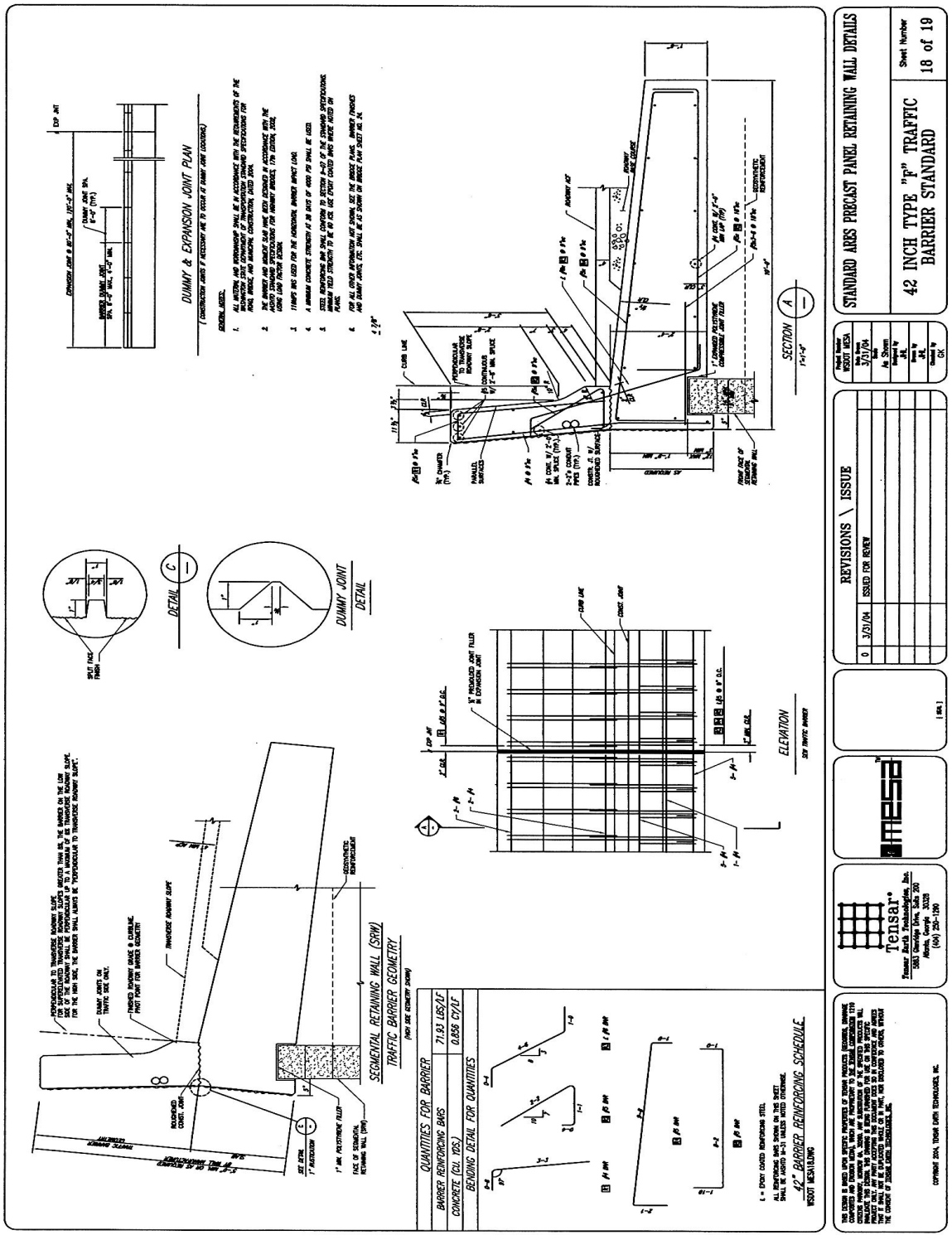


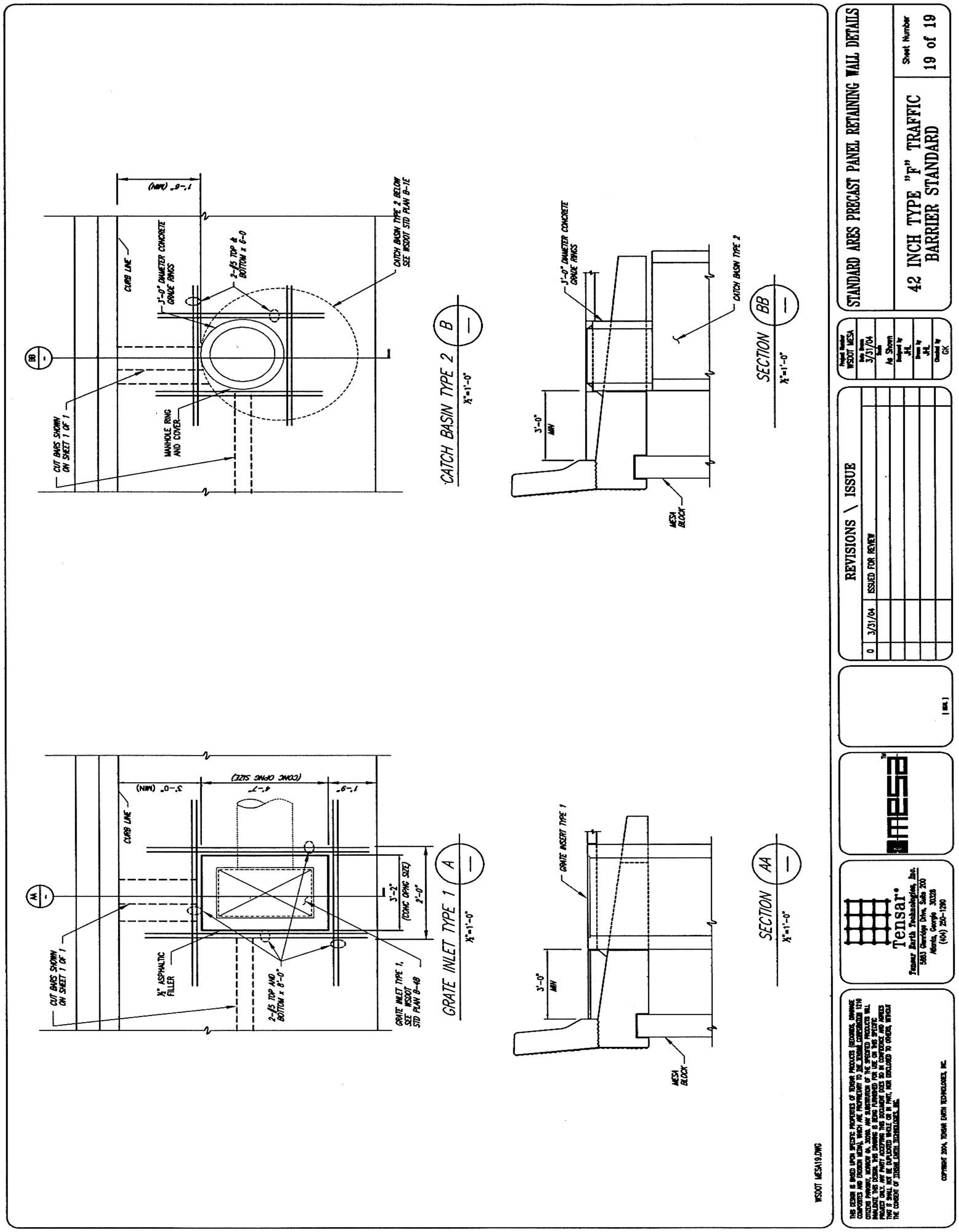
3" MINIMUM GROUT
FILTER FABRIC, 12" (MIN.) BEHIND PRECAST FACING AND 18" (MIN.) AGAINST PIPE.
PIPE WALL (24" MAX. PIPE DIAMETER)
SELECT FILL, TYPE AND LIMITS (BY OTHERS)
REINFORCED FILL (TYP.)
18.0"
12.0"
ARES PRECAST PANEL
PENETRATION OF PRECAST FACING PREFORMED AT TIME OF CASTING
PIPE PENETRATION DETAIL
NOT TO SCALE
2x PIPE DIAMETER (MIN.)
3" MIN. BETWEEN PIPE AND GEOGRID
15' (MAX.)
SETBACK VARIES
TYPICAL OBSTRUCTION AVOIDANCE DETAIL
NOT TO SCALE
FRONT FACE MSE WALL
MAX. DEFLECTION, 16"
PAVEMENT/OBSTRUCTION SECTION DEPTH VARIES, REFER TO CONTRACT DRAWINGS.
4" (MIN.)
HORIZONTAL PAVEMENT STRUCTURE
SUPERELEVATED SECTION
PAVING SECTION/OBSTRUCTION
SLOPE GEOGRID TO MATCH ROADWAY SUPER-ELEVATION
SUPER-ELEVATED PAVEMENT/OBSTRUCTION STRUCTURE
NOTE:
CONTRACTOR IS RESPONSIBLE TO COORDINATE THE PLACEMENT OF THE GEOGRID TO AVOID CONFLICT WITH THE CONTRACT PAVEMENT/OBSTRUCTION SECTION. GEOGRID MUST BE SEPARATED FROM THE PAVEMENT/OBSTRUCTION SECTION BY A MINIMUM OF 4".
GEOGRID PLACEMENT AT PAVEMENT/OBSTRUCTION SECTION
NOT TO SCALE
SHEET14.DWG
REVISIONS \ ISSUE
0 8/6/04 ISSUED FOR REVIEW
Tensar
STANDARD ARES PRECAST PANEL RETAINING WALL DETAILS
OBSTRUCTIONS
Sheet Number
14 of 19


C.I.P. TRAFFIC BARRIER (BY OTHERS)
TOP OF WALL
CATCH BASIN
1 1/2" STYROFOAM VOID FORM
TOP OF PAVEMENT
TENSAR BX110040 GEOGRID WRAP
1.5'
3" MIN.
ARES PRECAST PANEL
TENSAR UNIAXIAL STRUCTURAL GEOGRID (TYP.)
CROSS-SECTION
UNIAXIAL GEOGRID NOT SHOWN FOR CLARITY (EXTEND TO EMBEDMENT LENGTH OF ADJACENT ROLLS)
TENSAR BX110040 GEOGRID WRAP
1 1/2" STYRAFOAM VOID FORM
CATCH BASIN
4.0'
TENSAR UNIAXIAL STRUCTURAL GEOGRID (100% COVERAGE REQUIRED FOR EXTENTS OF HORIZONTAL #3 REBAR)
ARES PRECAST PANEL
PLAN VIEW
CATCH BASIN OBSTRUCTION DETAIL
NOT TO SCALE
GUARD RAIL (DESIGNED BY OTHERS)
3.0' (MIN.)
PENETRATE GEOGRID LAYER
REFER TO TYPICAL CROSS-SECTION FOR FILL AND DRAINAGE REQUIREMENT AT BACK OF WALL
ARES PRECAST PANEL
NOTES:
1. PLACE AND COMPACT BACKFILL TO FINISH GRADE.
2. AUGER THROUGH GEOGRID, AS REQUIRED, TO SPECIFIED DEPTH.
3. INSTALL POST AND FILL HOLE WITH 2000 PSI (MIN) CONCRETE, OR IN ACCORDANCE WITH PROJECT SPECIFICATIONS, WHICHEVER IS GREATER.
TOP OF WALL SECTION & GUARD RAIL DETAIL
NOT TO SCALE
SHEET15.DWG
Tensar
Tensar Earth Technologies, Inc.
5883 Glenridge Drive, Suite 200
Atlanta, Georgia 30328
(404) 250-1290
REVISIONS \ ISSUE
0 8/8/04 ISSUED FOR REVIEW
8/8/04
As Shown
GLD
KJK
STANDARD ARES PRECAST PANEL RETAINING WALL DETAILS
TYPICAL DETAILS
Sheet Number
15 of 19
COPYRIGHT 2004, TENSAR EARTH TECHNOLOGIES, INC.


STANDARD ARES PRECAST PANEL RETAINING WALL DETAILS
32 INCH TYPE "F" TRAFFIC BARRIER STANDARD
Sheet Number 16 of 19
REVISIONS \ ISSUE
0 3/31/04 ISSUED FOR REVIEW
Project Leader TXDOT MESH 3/31/04
Tensar
Tensar Earth Technologies, Inc.
5883 Glenridge Drive, Suite 200
Atlanta, Georgia 30328
(404) 250-1500
MESA
DUMMY & EXPANSION JOINT PLAN
SEGMENTAL RETAINING WALL (SRW)
TRAFFIC BARRIER GEOMETRY
DETAIL
DUMMY JOINT
ELEVATION
SECTION
QUANTITIES FOR BARRIER
BARRIER REINFORCING BARS 56.65 LBS/LF
CONCRETE (CU. YDS.) 0.537 CY/LF
BENDING DETAIL FOR QUANTITIES
BARRIER REINFORCING SCHEDULE
TXDOT MESH-LINING
COPYRIGHT 2004, TENSAR EARTH TECHNOLOGIES, INC.


CATCH BASIN TYPE 2 B
GRATE INLET TYPE 1 A
SECTION BB
SECTION AA
CURB LINE
CUT BARS SHOWN ON SHEET 1 OF 1
MANHOLE RING AND COVER
CATCH BASIN TYPE 2 SEE WSDOT STD PLAN 8-1E
GRATE INSERT TYPE 1
MESH BLOCK
STANDARD ARES PRECAST PANEL RETAINING WALL DETAILS
32 INCH TYPE "F" TRAFFIC BARRIER STANDARD
Sheet Number 17 of 19
REVISIONS \ ISSUE
ISSUED FOR REVIEW
Tensar Earth Technologies, Inc.
WSDOT MESA17.DWG


DUMMY & EXPANSION JOINT PLAN
DUMMY JOINT DETAIL
SECTION
ELEVATION
SEGMENTAL RETAINING WALL (SRW)
TRAFFIC BARRIER GEOMETRY
QUANTITIES FOR BARRIER
BARRIER REINFORCING BARS 71.93 LBS/LF
CONCRETE (CU. YDS.) 0.656 CY/LF
BENDING DETAIL FOR QUANTITIES
42" BARRIER REINFORCING SCHEDULE
WSDOT MESA/LIBING
REVISIONS \ ISSUE
0 3/31/04 ISSUED FOR REVIEW
Tensar
STANDARD ARES PRECAST PANEL RETAINING WALL DETAILS
42 INCH TYPE "F" TRAFFIC BARRIER STANDARD
Sheet Number
18 of 19


STANDARD ARES PRECAST PANEL RETAINING WALL DETAILS
42 INCH TYPE "F" TRAFFIC BARRIER STANDARD
Sheet Number
19 of 19
REVISIONS \ ISSUE
0
3/31/04
ISSUED FOR REVIEW
CATCH BASIN TYPE 2
SECTION BB
GRATE INLET TYPE 1
SECTION AA
CURB LINE
MESA BLOCK
WSDOT MESA19.DWG